

EXHIBIT A



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Ng

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(54) **BRUNNIAN LINK MAKING DEVICE AND KIT**(76) Inventor: **Cheong Choon Ng**, Novi, MI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 98 days.

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(51) **Int. Cl.****B65H 69/04** (2006.01)(52) **U.S. Cl.**USPC **289/17**(58) **Field of Classification Search**

USPC 289/2, 17, 16.5, 18.1; 273/281, 288, 273/309

See application file for complete search history.

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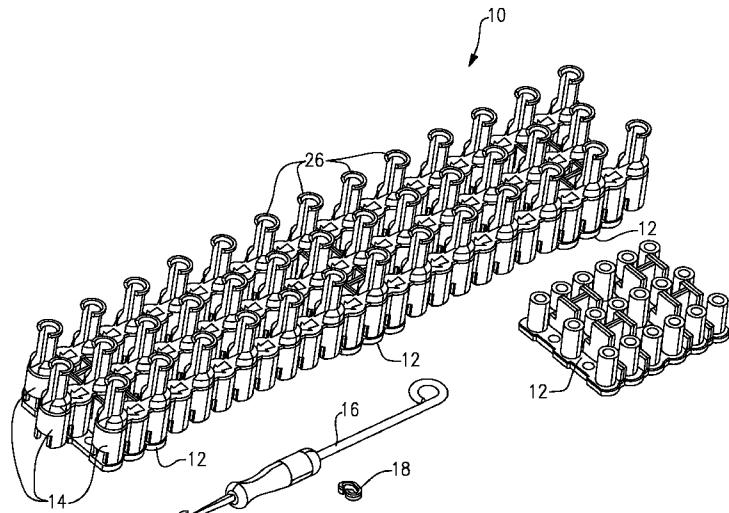
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ABSTRACT

A Brunnian link is a link formed from a closed loop doubled over itself to capture another closed loop to form a chain. The example kit provides for the successful creation of unique wearable articles using Brunnian link assembly techniques and includes several pin bars that are supported in a desired special orientation by at least one base. The desired special orientation is dependent on the desired linked configuration of the completed article. The base and pin bars may be assembled in various combination and orientations to provide endless variation of completed link orientations. Additional bases and pin bars can be to further expand possible completed article creation.

18 Claims, 10 Drawing Sheets

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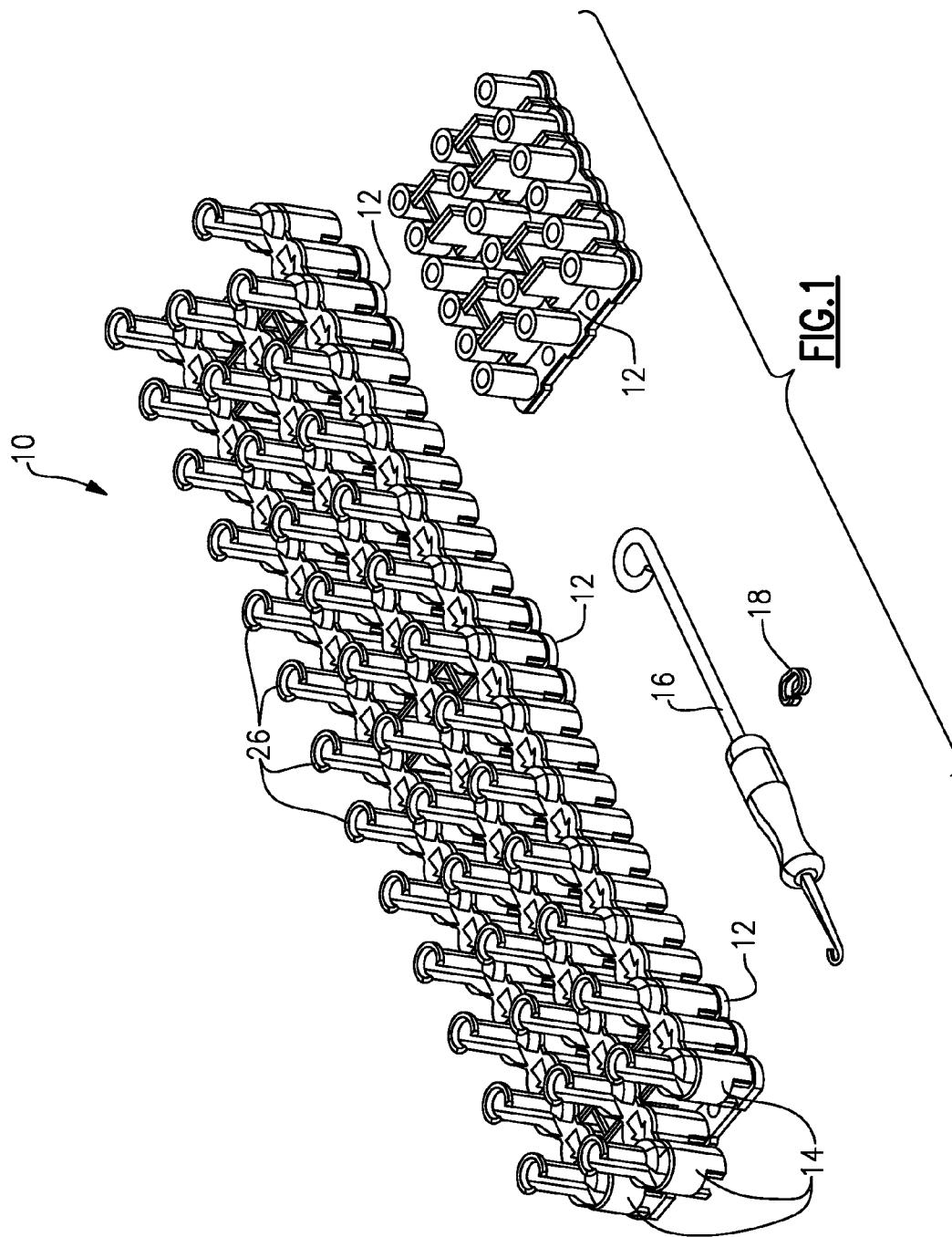
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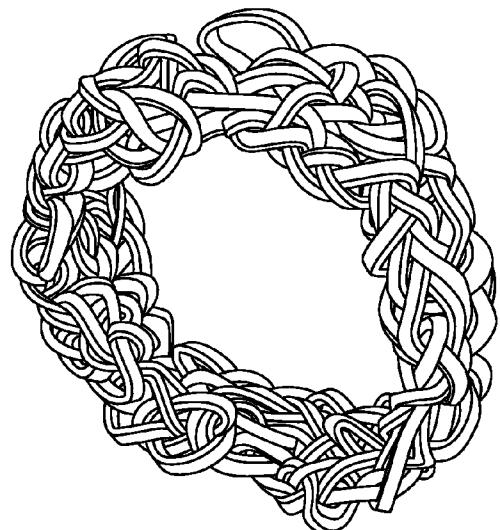


FIG. 2

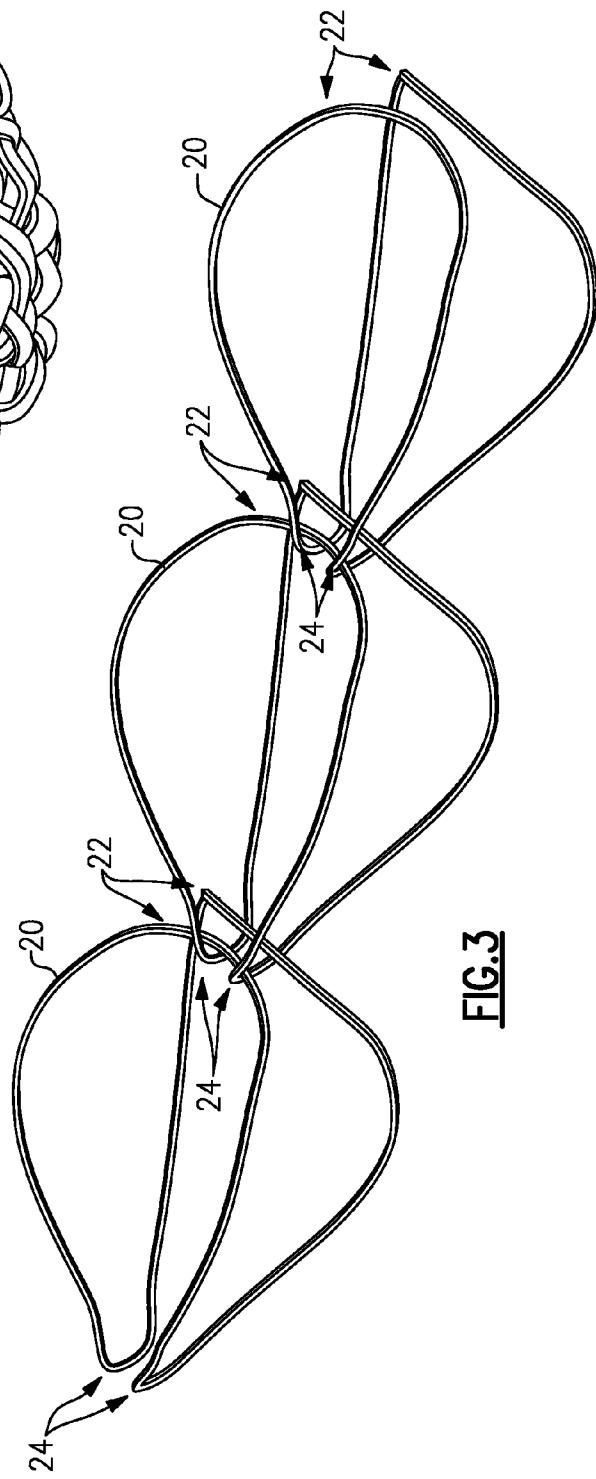


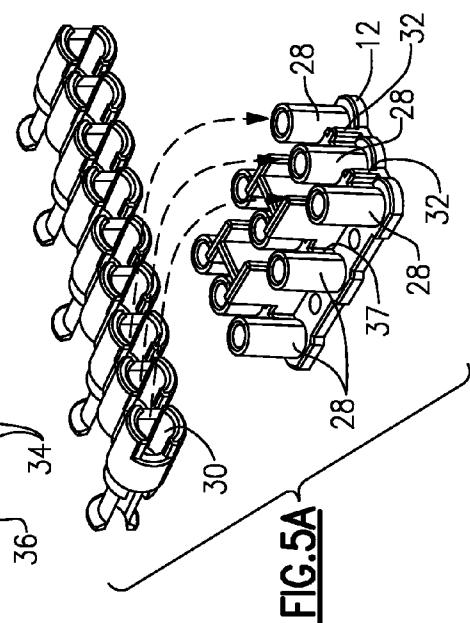
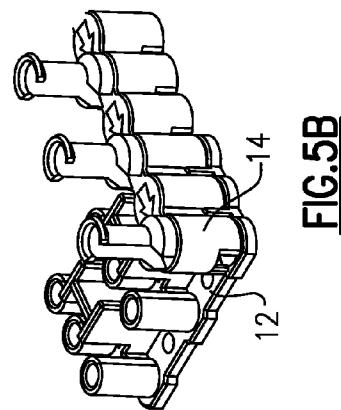
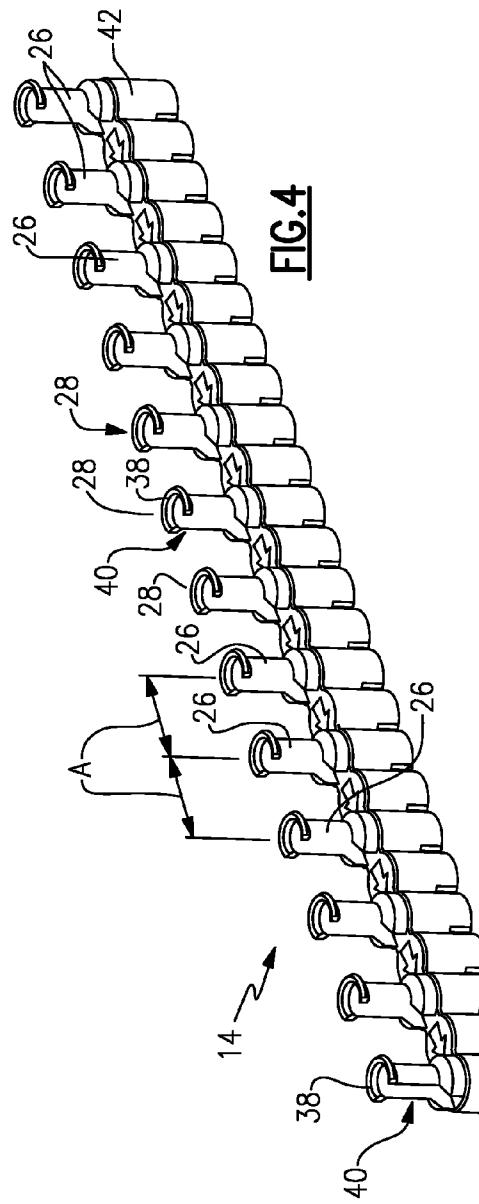
FIG. 3

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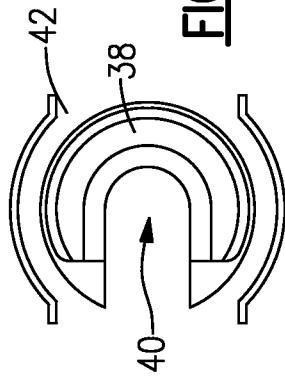
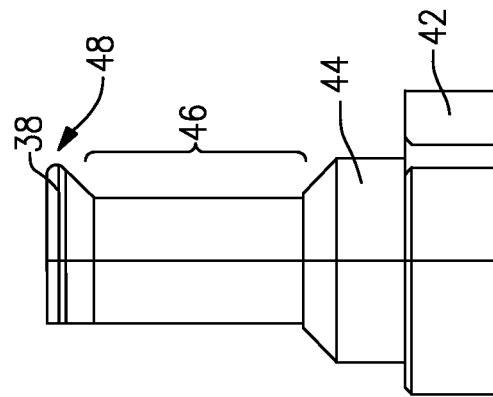
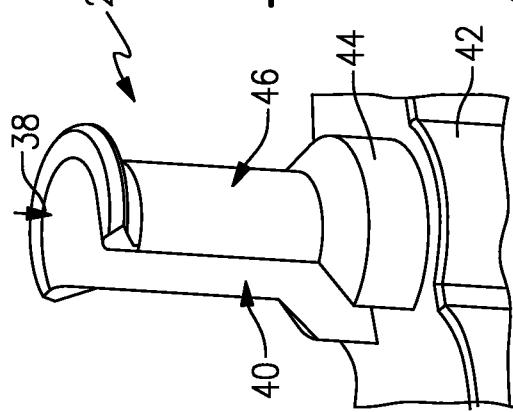
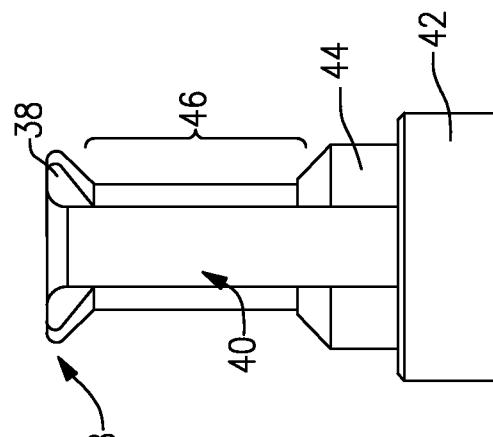


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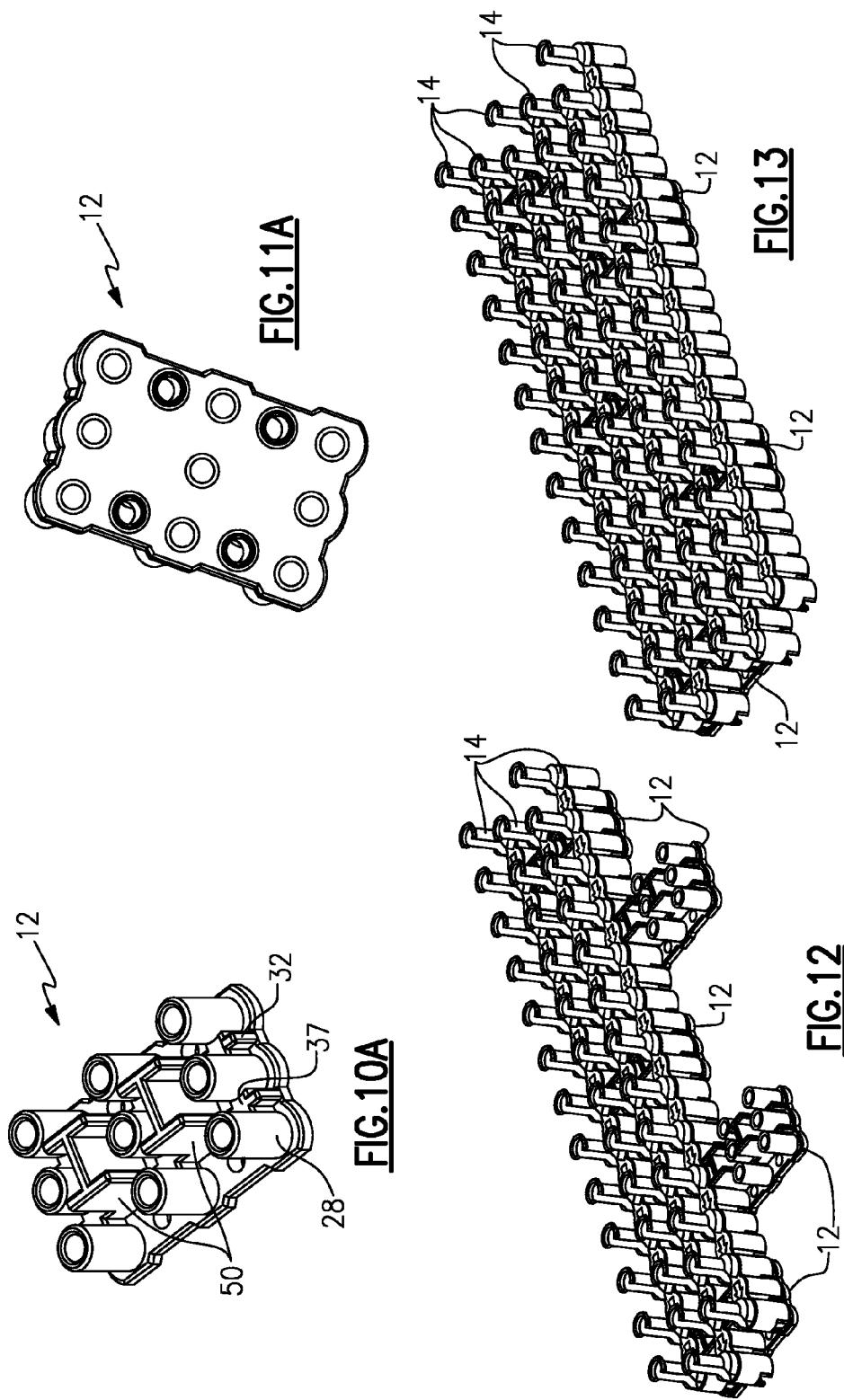
FIG. 9**FIG. 8****FIG. 6****FIG. 7**

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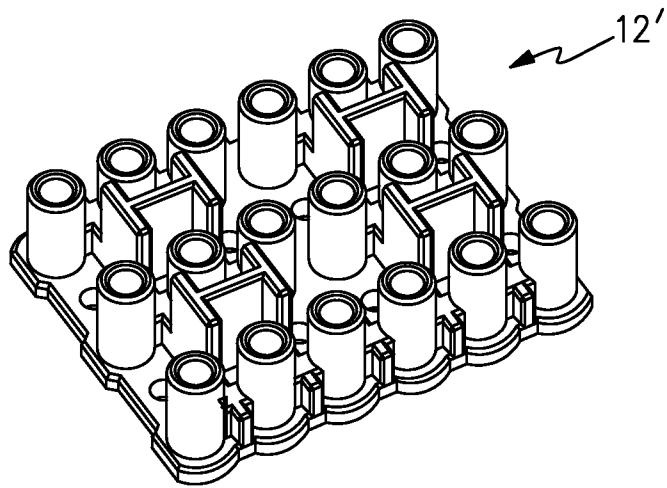


FIG.10B

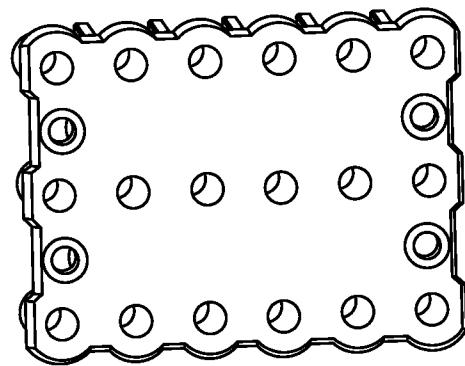


FIG.11B

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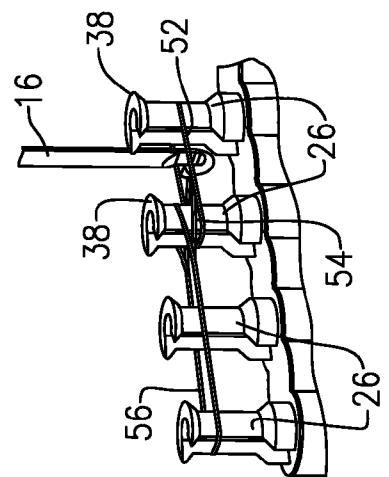


FIG. 14C

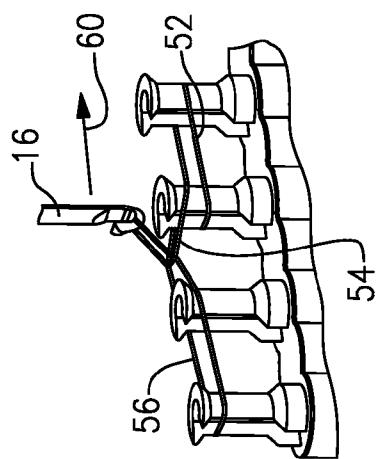


FIG. 14B

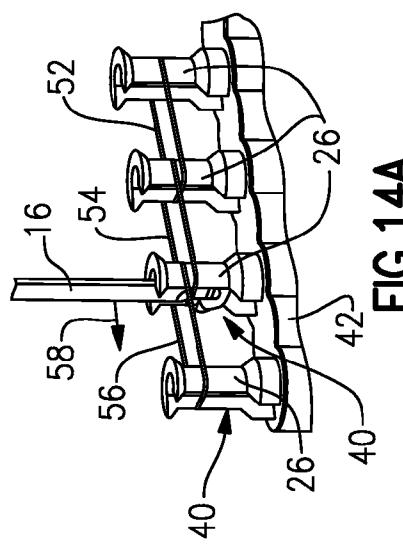


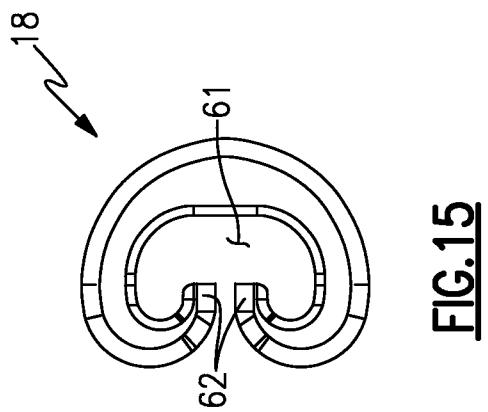
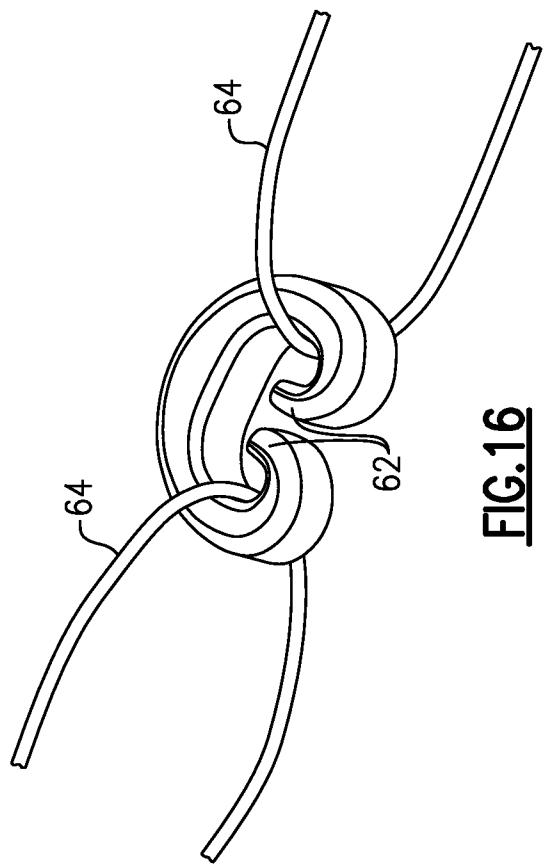
FIG. 14A

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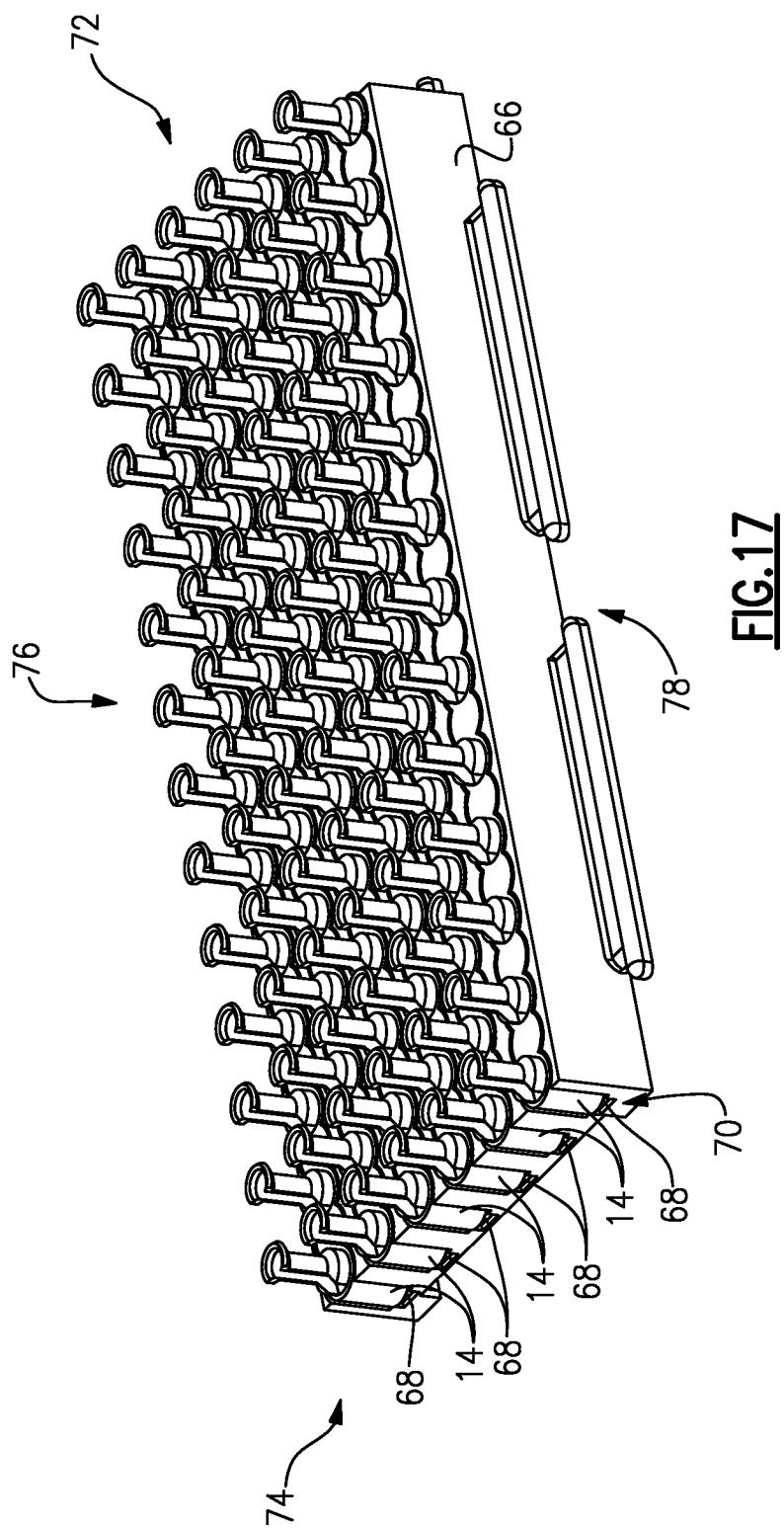


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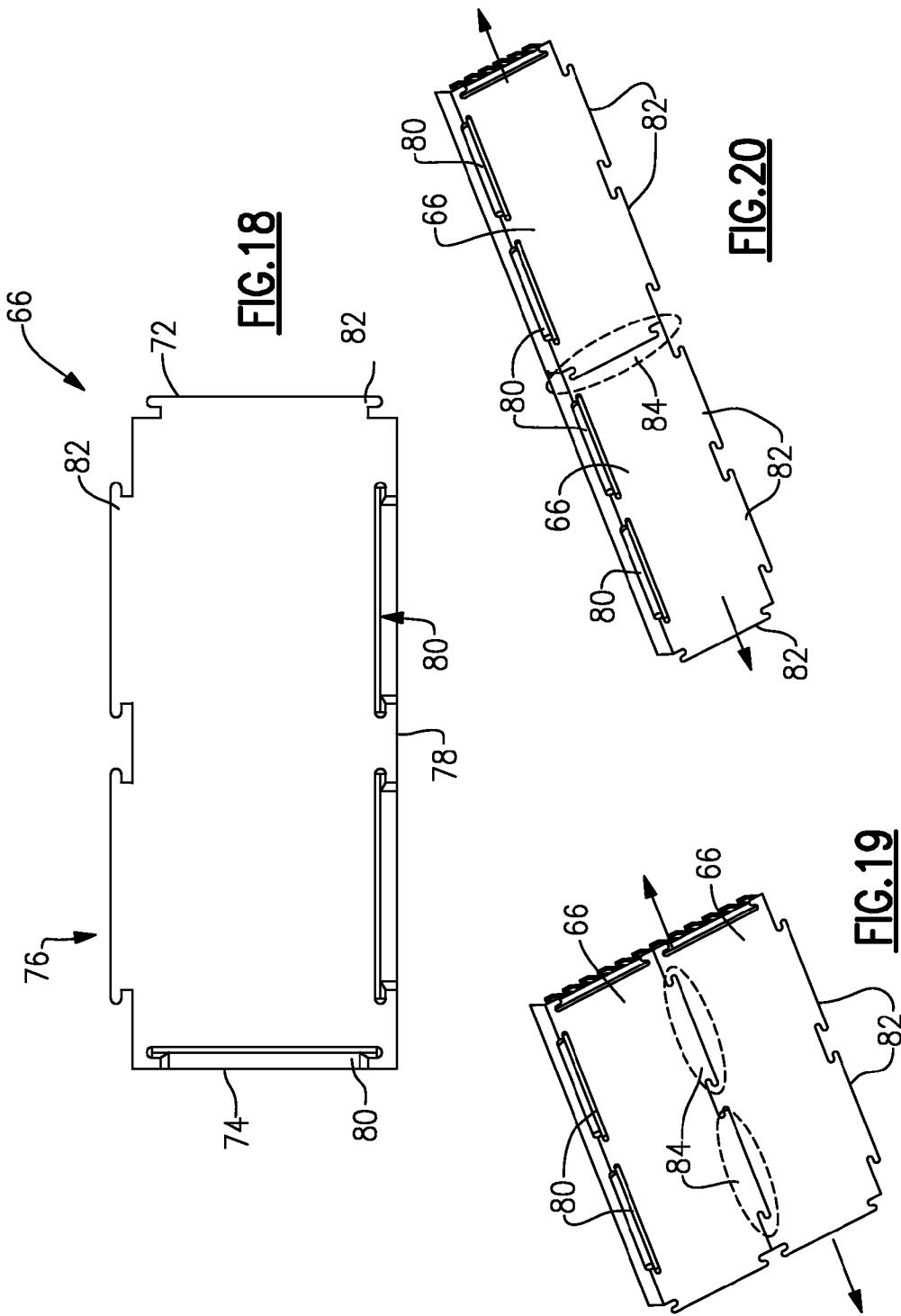


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1**BRUNNIAN LINK MAKING DEVICE AND KIT**

REFERENCE TO RELATED APPLICATION

This application claims priority to U.S. Provisional Application No. 61/410,399 filed on Nov. 5, 2010.

BACKGROUND

This disclosure generally relates to method and device for creating a linked item. More particularly, this disclosure relates to a method and device for creating a linked wearable item from elastic bands.

Kits that include materials for making a uniquely colored bracelet or necklace have always enjoyed some popularity. However such kits usually just include the raw materials such as different colored threads and beads and rely on the individual's skill and talent to construct a usable and desirable item. Accordingly there is a need and desire for a kit that provides not only the materials for creating a unique wearable item, but also that simplifies construction to make it easy for people of many skill and artistic levels to successfully create a desirable and durable wearable item.

SUMMARY

A Brunnian link is a link formed from a closed loop doubled over itself to capture another closed loop to form a chain. Elastic bands can be utilized to form such links in a desired manner. The example kit and device provides for creation of Brunnian link articles of complex configurations. Moreover, the example kit provides for the successful creation of unique wearable articles using Brunnian link assembly techniques.

The example kit includes several pin bars that are supported in a desired spatial orientation by at least one base. The desired spatial orientation is dependent on the desired link configuration of the completed article. The base and pin bars may be assembled in various combination and orientations to provide endless variation of completed link orientations. Moreover, additional bases and pin bars can be added to further expand possible completed article creation.

Each of the pin bars includes a flanged top portion for holding elastic bands in place and a front access groove. The front access groove provides for a hook to be inserted below a top most elastic band such that a lower band can be grasped and pulled over an adjacent band to form the Brunnian link. The disclosed kit provides for many possible orientations of adjacent pins, and therefore different orientations of and designs for a completed linked article.

These and other features disclosed herein can be best understood from the following specification and drawings, the following of which is a brief description.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an example kit for creating a Brunnian link article.

FIG. 2 is schematic view of Brunnian link articles.

FIG. 3 is a schematic view of a series of Brunnian links.

FIG. 4 is a perspective view of an example pin bar.

FIG. 5A is a perspective view of interfacing surfaces of an example base and the example pin bar.

FIG. 5B is a perspective view of a pin bar mounted to an example base.

FIG. 6 is a perspective view of one pin of the example pin bar.

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FIG. 7 is front view of one example pin.

FIG. 8 is side view of an example pin.

FIG. 9 is a top view of an example pin.

FIG. 10A is a perspective view of an example base.

FIG. 10B is a perspective view of another example base.

FIG. 11A is a bottom view of the example base.

FIG. 11B is a bottom view of another example base.

FIG. 12 is an assembly view of several bases assembled to several pin bars.

FIG. 13 is an assembly view of several pin bars mounted relative to each other in one desired special orientation.

FIGS. 14A-C are perspective views of assembly steps for creating a Brunnian linked article.

FIG. 15 is a plan view of an example clip for securing loose ends of a Brunnian linked article.

FIG. 16 is perspective view illustrating elastic bands secured with the example clip.

FIG. 17 is a perspective view of an example base template for holding pin bars in a desired special orientation.

FIG. 18 is a bottom view of the example base template.

FIG. 19 is a perspective view of side by side attachment of two base templates.

FIG. 20 is a perspective view of an end to end attachment of two base templates.

DETAILED DESCRIPTION

Referring to FIG. 1, an example kit is indicated at 10 for creating Brunnian link items such as bracelets, necklaces and other wearable or decorative items shown in FIG. 2.

Referring to FIG. 3, a Brunnian link 20 is formed from a continuous looped structure without forming an actual knot. Several links are formed in a chain to form a circular structure. The ends are then secured and a durable wearable item is created. In this example three closed looped elastic items 20 such as rubber bands are shown forming a single chain. Each link is formed by capturing ends 22 of one loop structure with a mid portion 24 of another loop structure in series. Each link depends on the previous and subsequent links to maintain the desired shape and integrity. Removing one link 20 results in all of the links becoming loose from each other.

Referring to FIG. 1, the example kit 10 includes a base 12 that supports pin bars 14 that each includes a plurality of pins 26. A hook tool 16 is included for grasping and moving bands from one pin 26 to another. A clip 18 receives ends of the completed links to complete and secure the linked item. One or several pin bars 14 are mounted to several bases 12 as is shown to support the pin bars 14 and the corresponding pins 26 in a desired alignment. In this example, a center pin bar 14 is incremented one up from the two outermost pin bars 14. This alignment provides for creation of a desired linked item. In this example three bases 12 are utilized to support the pin bars 14 in a desired relative orientation.

Referring to FIGS. 4, 5A-B, with continued reference to FIG. 1, the base 12 includes a plurality of upward extending cylinders 28 that are received within a corresponding opening 30 defined at the bottom of each pin 26 the pin bar 14. The cylinders 28 of the base 12 and the openings 30 receiving the cylinders 28 are mating features that define a slight interference fit to hold the pin bar 14 in place. Although three bases 12 are shown in this example, more or less could be utilized to support additional numbers of pin bars 14.

The base 12 includes tabs 32 disposed between the cylinders 28 that fit within corresponding slots 34 defined on the pin bar 14. The interface between the tabs 32 and slots 34 provide alignment and maintain the upright orientation of the pin bars 14. Each of the pins 26 includes a front slot 36 that

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receives a boss **38** defined between cylinders **28** of the base **12**. The front slot **34** and boss **38** interface further aligns and supports the pin bar **14** on the base **12**.

The pin bar **14** is an integral structure having the plurality of pins **28** defined in a single row. Each of the pins **28** are spaced an equal distance **A** apart. Each of the pins **28** includes a flanged top **38** and a front access groove **40**.

Referring to FIGS. **6**, **7**, **8** and **9**, each pin **26** extends upward from a bar portion **42** and include features for holding and spacing rubber bands. Each pin **26** includes the flanged top **38** that is flared outward to prevent errant release of a rubber band during creation of a link. The access groove **40** is a longitudinal groove that extends inward toward a center of the pin **26**. The access groove **40** extends from the bar portion **42** to an open end with the flanged top **38**. The groove **40** provides a clearance for insertion of the hook tool **16** (FIG. **1**) utilized for moving ends of a rubber band between pins **32**.

Each of the pins **26** includes a bottom portion **44** that is flared outward from a diameter of a mid portion **46**. The mid portion **46** of the pin **26** is where a rubber band is secured during assembly. The bottom portion **44** is flared outward to prevent the rubber band from slipping downward against the bar portion **42**. The top and bottom flared portions **38**, **44** centers the rubber bands in the mid portion **46** to provide a desired alignment during assembly. The edges of the flange **38** are rounded over to eliminate sharp edges or surfaces.

Referring to FIGS. **10A** and **11A**, the example base **12** includes three rows of three cylinders **28** that are spaced equal distance from each other. The tabs **32** and bosses **37** are received within corresponding slots **34** and **36** formed on the pin bar **14**. A stabilizer **50** is disposed between each row of cylinders **28** to provide further lateral support for the pin bars **14**.

Referring to FIGS. **10B** and **11B**, another example base **12'** includes a three row of six cylinders **28** that are spaced an equal distance from each other. The additional cylinders **28** provided by the larger example base **12'** provide for mounting of additional pin bars **14** with the same number of bases **12'**. As appreciated, it is within the contemplation of this disclosure to provide a base with any number of rows of and columns of cylinders **28** that provide varying mounting configurations for the pin bars **14**.

Referring to FIGS. **12** and **14**, the base **12** is utilized to set a desired pattern and uniform spacing between several pin bars **14**. Accordingly, each of the bases **12** can engage one or several pin bars **14**. The base **12** can engage and be receive three pin bars **14** longitudinally, and/or may be added to a side of a group of pin bars to add additional pin bars beyond the three provided for by one base **12**. FIG. **12** illustrates a configuration where three bases are supporting three pin bars **14** and two additional bases **12** are engaged to the current pin bars **14** with only one row such that two rows of cylinders **28** extend laterally to receive additional pin bars **14**. FIG. **13** illustrates a configuration where five pin bars **14** are aligned side by side as provided by the additional bases **12** extending laterally as shown in FIG. **12**. As is appreciated, the extent to which additional bases and pin bars **14** can be added and the configurations possible are limited only by the desire of the user of the disclosed kit. The addition of pin bars **14** provides for more unique and intricate designs limited only by the imagination of the user of the kit.

Referring to FIGS. **14A-C**, a method of forming a Brunnian link as provided by the example kit includes the initial step of loading elastic bands onto adjacent pins **26**. In this example, beginning at the right most ends each rubber band are stretched over adjacent pins and held at the mid portion. A first elastic band **52** is placed between a first pair of adjacent

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pins **26** A second elastic band **54** is then placed over one end of the previously assembled first elastic band **52**, and then a third elastic band **56** and so on until the desired number of rubber bands have been placed on corresponding pin bars **14**. Note that in these example only three elastic bands **52**, **54**, and **56** are shown for explanation purposes, however, in practice, many elastic bands would be utilized to provide the desired length of a completed article.

Once the elastic bands **52**, **54**, and **56** are placed on each of the pins **26**, the hook **16** is inserted into the access groove **40** and moved downward past the top most elastic bands **56**. The hook **16** is then moved outward from the groove in a direction indicated by arrow **58** a sufficient distance to allow for one end of the elastic band **54** to be caught in the hook end. Further lifting pulls the captured end of the second elastic band **54** in the direction indicated by **60** up through the end of the third elastic band **56** for assembly on to another adjacent pin **26** as is shown in FIG. **14B**. The captured end is pulled up and over the flanged top **38** and pulled back onto the adjacent pin to form a single link. The captured end of the elastic band **54** is then released to engage the adjacent pin **26**. This process is repeated until a chain of links a desired length is obtained.

The example illustrated in FIGS. **14A**, **14B** and **14C** illustrate a chain formed from a single row of links. The example base template **12** can be arranged to support many pin bars **14** and therefore links can be formed longitudinally and laterally across adjacent pin bar **14** to form a wide variety of link configurations and combinations.

Referring to FIGS. **15** and **16**, once the link is created, the clip **18** is used to secure the ends such that the fabricated chain of links does not come undone. The clip **18** is substantially C-shaped with an inward facing ends **62** that trap ends of the elastic bands **64** within the inner area **61**.

Referring to FIGS. **17-20**, an example base template **66** is shown for holding six pin bars **14** in a desired orientation. Each of the example pin bars **14** includes the opening **30** of a defined size and the base template **66** includes a plurality of circular bosses **68** that are sized to provide a desired tight interference fit with the openings **30** in the pin bar **14** such that the pin bar **14** is retained in place within grooves **70** of the base template **66**. The interference fit between the pin bar **14** and the bosses of the base template **66** assure a positive mounting and securing of to the base to prevent separation during use and construction of a desired wearable item.

Referring to FIGS. **18**, **19** and **20**, the base template **66** includes first and second ends **72**, **74** and first and second sides **76**, **78** between the first and second ends **72**, **74**. The first end **72** includes a male joint **80** and the second end **74** includes a corresponding female joint **80**. The first side **76** includes a male joint **82** and the second side **78** includes a female joint **80**. The alternating sides provide for attachment of several base templates **66** to each other to provide extended capability.

FIG. **19** illustrates two base templates **66** connected to each other in a side-to-side configuration by way of joints **84**. FIG. **20** illustrates two base templates **66** connected to each other in an end-to-end configuration by way of joint **84**. As appreciated, any number of base templates **66** can be secured to each other to form many different desired configurations. The different configurations provide for many options for creating different shapes and configurations of wearable items.

Accordingly, the example kit and method provide for the creation of many different combinations and configurations of Brunnian links for the creation of bracelets, necklaces, and other wearable items. Moreover, the example kit is expandable to further create and expand the capabilities of potential Brunnian link creations. Further, the example kit provides for

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the creation of such links and items in an easy manner allowing persons of varying skill levels to be successful in creating unique wearable items.

Although an example embodiment has been disclosed, a worker of ordinary skill in this art would recognize that certain modifications would come within the scope of this disclosure. For that reason, the following claims should be studied to determine the scope and content of this invention.

What is claimed is:

1. A kit for creating an item consisting of a series of links, 10 the device comprising:

a base; and

at least one pin bar supported on the base, the pin bar including a plurality of pins each including a top flared portion for holding a link in a desired orientation and an 15 opening on a front side of each of the plurality of pins.

2. The kit as recited in claim 1, wherein the pin bar and the base including corresponding mating features for securing the pin bar to the base.

3. The kit as recited in claim 2, wherein the base includes a 20 plurality of mating structures receivable within a mounting opening defined within each of the plurality of pins with an interface between each of the mating structures and mounting openings defining an interference fit.

4. The kit as recited in claim 3, wherein each of the mating structures comprises upright extending cylinders and the mounting openings are round to receive a corresponding one of the cylinders.

5. The kit as recited in claim 1, wherein each of the plurality of pins includes a bottom flared portion spaced apart from the 30 top flared portion and a mid portion for holding a link.

6. The kit as recited in claim 1, wherein the base comprises a plurality of bases for securing a plurality of pin bars in a desired relative special orientation for forming the series of links in a desired pattern.

7. The kit as recited in claim 6, wherein the base comprises a key and each of the plurality of pin bars includes a corresponding slot for aligning each of the plurality of pin bars relative to the base and to others of the plurality of pin bars.

8. The kit as recited in claim 1, including a hook adapted to 40 extend into the access groove for capturing one end of a link.

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9. The kit as recited in claim 1, including a clip for securing ends of the series of links together.

10. The kit as recited in claim 1, wherein the series of links comprises a series of elastic bands.

11. The kit as recited in claim 1, wherein the series of links comprise a series of Brunnian links.

12. A method of creating a linked item comprising the steps of:

supporting at least one pin bar including a plurality of pins to a base to define a desired relative special relationship between at least two adjacent pins;

assembling at least two elastic bands across adjacent pins; capturing one end of an elastic band and pulling the end over and onto an adjacent pin while engaged with another elastic band; and

capturing and pulling subsequent ends over until a desired link length and configuration is obtained.

13. The method as recited in claim 12, wherein a second of the at least two elastic bands is placed atop one end of the first of the at least two elastic bands on a common pin.

14. The method as recited in claim 13, wherein capturing one end of the elastic band includes using a hook tool reaching into an access groove of the pin to extend below the top most elastic band and grasp a bottom elastic band with the hook tool.

15. The method as recited in claim 12, including assembling a plurality of pin bars to a base to provide parallel rows of pins.

16. The method as recited in claim 15, including the step of assembling the plurality of pin bars to a corresponding plurality of bases to define a desired pattern of pins.

17. The method as recited in claim 15, including assembling a plurality elastic bands in a desired pattern to the plurality of pin bars including at least one elastic band that extends between pins of another pin bar.

18. The method as recited in claim 15, including the step of inserting ends of the elastic bands into a clip to form the linked item.

* * * * *